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standpoint. Preliminary to his solution of this problem, when speaking of the necessary near approach of comets to the sun in order that they may be visible, Laplace says: "One conceives that in order to approach so near the sun their velocity at the moment of their entrance into his sphere of activity must have a magnitude and direction comprised within narrow limits. It is required, therefore, to determine within these limits the ratio of the chances that give a sensible hyperbola to the chances that give an orbit which may be confounded with a parabola." But I cannot see that we gain much by the application of the calculus of probabilities to this question unless it be a somewhat clearer definition of the problem, since the conditions by which we restrict our solution are known beforehand, and as these conditions are varied our results will be changed. The condition of the question is this: We now have more than two hundred well known cometary orbits without a single example of a decided hyperbolic motion. No matter, therefore what may be the result of the application of the calculus of probabilities, it is quite certain that if comets enter our solar system they must do so under conditions that render very small the chance of hyperbolic orbits. On the other hand, we have a few, six or eight, orbits of meteors that show a hyperbolic motion. But in this case we have orbits that are determined from observations made with difficulty and which may be affected by large errors in the time of the flight of the meteor and in its position. The true course appears to be that our methods of observing meteors should be very much improved, so that we may obtain accurate observrtions of the duration of their flight and the position of their apparent paths. Then, having secure data, we can derive certain conclusions.

NOTE.—It may be interesting to see how Laplace gets the expression (*a*), given above. In addition to the notation already introduced, let a and e be the semi-axis major and the excentricity of the orbit; and let ω be the direction which the comet's motion makes with PS. Then we shall have the well known equations

$$v^2 = \frac{2}{r} - \frac{1}{a},$$

$$r\,v\,.\,\sin\omega = \sqrt{a(1-e^2)},$$

$$D = a\,(1-e);$$

Eliminating *a* and *e* from these equations, we have,

$$\sin^2 \omega = \frac{2\,D - \dfrac{2\,D^2}{r} + D^2\,v^2}{r^2\,v^2}:$$

Imagine a small sphere whose center is at the point *P*. The motion of the comet may be directed toward any point on the surface of the half of this sphere comprised within the sphere of the sun's activity. The probability of a direction forming the angle ω with *PS*, the radius-vector, will be $2\pi.\sin\omega$. Hence, dividing the integral $2\pi.\int\sin\omega\,.\,d\,\omega$ by the surface of the semi-sphere we shall have the probability that the direction of the motion will be comprised within the limits zero and ω. This probability is $1 - \cos\omega$; and from the above value of $\sin^2\omega$ we easily find the expression (*a*).

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REPETENDS.

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(*Continued from page* 15.)

Let us illustrate by an example:

Suppose $\frac{1}{17}$ is to be reduced; we know from the *second principle* that the last figure must be 7, and from (1) we get $r_2 = 12$. It is convenient to write $r_2\,q_1$, $r_2\,q_2 + m_1$, &c., in a column, thus:

$$\begin{array}{rcrcrcl}
 & & & & & & q_1 = 7 \\
r_2\,q_1 & = & 84 & \therefore & m_1 & = & 8 \text{ and } q_2 = 4 \\
r_2\,q_2 + m_1 & = & 56 & \therefore & m_2 & = & 5 \text{ and } q_3 = 6 \\
r_2\,q_3 + m_2 & = & 97 & \therefore & m_3 & = & 7 \text{ and } q_4 = 7 \\
r_2\,q_4 + m_3 & = & 91 & \therefore & m_4 & = & 9 \text{ and } q_5 = 1 \\
r_2\,q_5 + m_4 & = & 21 & \therefore & m_5 & = & 2 \text{ and } q_6 = 1 \\
r_2\,q_6 + m_5 & = & 14 & \therefore & m_6 & = & 1 \text{ and } q_7 = 4 \\
r_2\,q_7 + m_6 & = & 49 & \therefore & m_7 & = & 4 \text{ and } q_8 = 9 \\
r_2\,q_8 + m_7 & = & 112 & \therefore & m_8 & = & 11 \text{ and } q_9 = 2 \\
r_2\,q_9 + m_8 & = & 35 & \therefore & m_9 & = & 3 \text{ and } q_{10} = 5 \\
r_2\,q_{10} + m_9 & = & 63 & \therefore & m_{10} & = & 6 \text{ and } q_{11} = 3 \\
r_2\,q_{11} + m_{10} & = & 42 & \therefore & m_{11} & = & 4 \text{ and } q_{12} = 2 \\
r_2\,q_{12} + m_{11} & = & 28 & \therefore & m_{12} & = & 2 \text{ and } q_{13} = 8 \\
r_2\,q_{13} + m_{12} & = & 98 & \therefore & m_{13} & = & 9 \text{ and } q_{14} = 8 \\
r_2\,q_{14} + m_{13} & = & 105 & \therefore & m_{14} & = & 10 \text{ and } q_{15} = 5 \\
r^2\,q_{15} + m_{14} & = & 70 & \therefore & m_{15} & = & 7 \text{ and } q_{16} = 0
\end{array}$$